British Journal of Medicine & Medical Research
20(12): 1-9, 2017, Article no.BJMMR.26919
ISSN: 2231-0614, NLM ID: 101570965

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Clinical and Radiographic Features of Knee Osteoarthritis of Elderly Patients

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJMMR/2017/26919
Editor(s):
(1) Masahiro Hasegawa, Department of Orthopaedic Surgery, Mie University Graduate School of Medicine, 2-174 Edobashi, Tsu City, Mie, 514-8507, Japan.
Reviewers:
(1) Robert Meves, Santa Casa Scholl of Medicine, Brazil.
(2) Marks, Columbia University, New York, USA.
(3) Nyoman Kerrtia, Dr. Sardjito Hospital – Yogyakarta, Gadjah Mada University, Indonesia.
Complete Peer review History: http://www.sciencedomain.org/review-history/18711

Original Research Article

Received 10th May 2016
Accepted 4th June 2016
Published 21st April 2017

ABSTRACT

Background: Knee osteoarthritis is a common pathology, characterized by a prevalence that increases with age. Absence of correlation between anatomy and the clinical features makes medical care complex, particularly in a geriatric setting where study is wanting.
Methods: Cross-sectional study including patients who were monitored for 6 months for knee osteoarthritis. A comparaison was made between of those various characteristics between patients of over 65 years of age (group 1; n=56) and those under 65 (group 2; n=56).
Results: The age bracket of group1 was 71±5 years with a feminine predominance. Gonalgia had been evolving for 8.4±9.2 years, bilateral in 82.6% and mechanical in 94.6%. The patients experienced an average pain scale of 65.2 mm. An axial deviation of lower limbs was observed in 60.7% and a limited mobility of the knees in 48.2%. The mean value of Lequesne index was 11.02±4.8. The walking distance was not limited in 37.5%. Comparative study showed that elderly patients had a smaller waist size (p=0.003), a longer course of gonalgia (p<0.0001), a widespread site of pain (0.004), and a more frequent limitation of walking distance (p<0.0001) as well as more

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axial deviation (p<0.0001) and joint mobility limitation (p=0.005). Gonalgia manifesting during rest was more frequent in elderly patients (p=0.001). Impaired functioning (p=0.001) and stage of radiographic damage (p=0.02) were more advanced in elderly patients.
Conclusion: This study shows that knee osteoarthritis is more severe in the elderly patients in its various and anatomical aspects as well as its impact on normal functions.

Keywords: Knee osteoarthritis; elderly patients; pain; imaging.

1. INTRODUCTION

Osteoarthritis is the most widespread chronic joint pathology in the world and one of the most frequent origins of joint pain and handicap in the elderly [1]. Half of the population of the 65-year olds and over is victim to osteoarthritis [2]. The knee constitutes the favoured site of osteoarthritis, a disease degenerative of cartilage [3]. Today, knee osteoarthritis is considered a serious threat to the elderly as it is known as a predictive factor of oncoming cardiovascular diseases [4]. Gonalgia, associated to knee osteoarthritis, encourage a sedentary lifestyle due to the mechanical aspect of pain, cause a progressive reduction of daily activities and restrict involvement in social life, leading up to loss of autonomy, over the medium or long term [5].

The absence of any anatomo-clinical correlation of the knee osteoarthritis further compounds medical care, particularly in the geriatric field where clinical and radiological data about knee osteoarthritis are less than abundant in the literature.

The object of the present study is to draw the epidemio-clinical profile, the extent of the function impairment and the radiographical details of knee osteoarthritis in the elderly patients as opposed to patients aged less than 65.

2. METHODS

This is a cross-sectional study concerning subjects who had been outpatients at the rheumatology department of a university medical centre, for six months, where knee osteoarthritis was diagnosed according to ACR criteria [6]. The study has been approved by the local ethnics committee of the hospital and all participants gave their informed consent. The following patients have been excluded: patients with a knee osteoarthritis secondary to a bone disease (Paget's disease, aseptic bone necrosis), to a septic arthritis, to a microcrystalline pathology (chondrocalcinosis, ochronosis, hemochromatosis) or to a trauma; past or present inflammatory arthropathy; intra-articular treatment by corticosteroids or hyluronic acid during the last three months; history of knee survey; and history of listening and comprehension problems that would make them incapable of answering the questions.

The patients were split into two groups. The first group (group 1) aged 65 and over, labeled elderly [7] and which corresponded to our study population and a second control group of patients under 65 (group 2). The demographic characteristics include gender, age, profession, marital status and rural or urban origins. Weight (W) and height (H) were collected respectively in kilograms (kg) to the nearest 0.1 kg and in centimeters (cm) to the nearest 0.1 cm, using standard equipment and following standard procedures. Body mass index (BMI) was determined by dividing W in kg by H in meters (kg/m^2). Excessive weight-gain was determined by the BMI according to the world health organization classification [8]. Waist circumference (WC) was measured to the nearest 0.1 cm at the umbilicus by taking the largest abdominal perimeter on exhalation. WC allowed us to single out subjects who presented waist obesity (WC≥80cm in women and WC ≥94 cm in men). Characteristics of gonalgia were gathered: duration of the symptoms evolution, acute or chronic characteristic, mechanical or inflammatory characteristic, occurrence when active or inactive and type of activity, the bilateral nature, the site, irradiation, flinching, locking, cracking sounds and intensity of pain on a visual analog scale (VAS) engraved from 0 to 100 mm (0= absence of pain, 100= worst possible pain). Anomalies of the physical examination have been noted: axial deviations of lower limbs and their type, limping, patella shock, pain when in action, limitation of mobility, patella crepitation and painful points. The functional consequences of the knee osteoarthritis were determined by the walking distance (WD) and with the aid of Lequesne index in the Tunisian dialect [9].

All patients have had a standard load radiography face and profile of both knees and a 30° axial view. The reading of the radiography focused on the three areas of the knee joint: patella femoral, internal stifle and external stifle joint, using radiographic score of Kellgren and Lawrence [10]. This evaluation was made by unique examiner (university hospital doctor).

Data was gathered using excel software and analyzed with SPSS software, version 11.5. We have calculated simple and relative frequencies for the qualitative variables. For the quantitative variables, we have calculated averages, medians and standard deviations and determined the extreme values. Comparisons of 2 averages on independent series were made by way of the Student t-test. Comparisons of several averages on independent series were made using F-test of Snedecor of parametric analysis of variance. Comparisons of percentages on independent series were made using Pearson chi-square test and when that failed and the comparison of 2 percentages failed, Fisher bilateral exact test was used. In all statistic tests, a significance level of 0.05 was used.

3. RESULTS

During the period of the study, 112 patients were arranged in 2 groups of 56 patients each.

3.1 Demographic and Anthropometric Characteristics of Patients Aged Over 65

The clinical and anthropometric characteristics of the two groups are detailed in Table 1. The mean age of the elderly patients (Group 1) was 71±5 years, with a clear feminine prevalence (73.3%). The dominant age bracket was between 65 and 70. Most of the participants of group 1 were married (66.5%), 26.8% were widow(er)s and 10.7% were single; 69.6% had at least one comorbidity. Respectively, W, H and mean BMI

Table 1. Socio-demographic and anthropometric characteristics of both groups

	Group 1 (n=56)	Group 2 (n=56)	p
Sex ratio	**0.36**	**0.16**	**0.102**
Profession (%)			p=0.74
Manual work	25	14	
Nonel	75	39	
Origin (%)			p=0,541
Urban	71.4	66.1	
Rural	28.6	33.9	
Comorbidities (%)	69.6	50	**0.034**
HTA	58	23	**0.001**
Dysthyroidism	7.1	16	**0.025**
Diabetes	35.7	5	**0.001**
PUD	1.7	12.5	**0.005**
Others	32.1	19.6	0.497
Weight (kg) average	70.98	74.95	0.071
[min-max]	[48-105]	[55-110]	
Height (cm) average	158	159	0.404
[min-max]	[144-175]	[144-177]	
BMI (kg/m^2) average	28.11	29.29	0.142
[min-max]	[21.33-38.57]	[22.77-42.44]	
BMI categories (%)			0.543
Normal	19.6	14.3	
Overweight	51.8	48.2	
Obesity	28.6	37.5	
WC (cm) average	93.66	100.48	**0.003**
[min-max]	[68-120]	[81-135]	
Abdominal obesity (%)			0.105

HTA: arterial hypertension – PUD: peptic ulcer disease – BMI: body mass index – WC: waist circumference - min: minimum. max: maximum. kg: kilogram. m:meter- cm: centimeter. N: number

were 70.9±11 kg, 158.8±0.06 cm and 28.1±4 kg/m^2. The mean WC was 93.66±11 cm and 80% had an abdominal obesity. The comparative study did not reveal any statistically significant differences between the two groups of patients concerning the sex ratio, the professional status, the origin and the anthropometric parameters. However, the patients of group 1 had more comorbidities and a less important WC with statistically significant differences.

3.2 Gonalgia Characteristics in Patients Aged Over 65

The average duration of evolution of pain was 8.4±9.2 years with an average VAS of 65.2±18 mm. Gonalgia was of a mechanical type in 94.6% of the cases, chronic in 82.1 of the cases and of anterior site in 55.4% of the cases. A lower irradiation of pain was registered in 10.7%. Pain was bilateral in 82.6% of the cases. In the cases where it was unilateral, there was no predominance of sides. Gonalgia was registered in 48.2% of inactive patients and emerged in all cases when the patient was acive. Effort triggering pain was due to walking in 89.3% of the cases and to prolonged standing position (10.7%). Flinching, locking and cracking were registered in 39.3%, 16.1% and 17.9% of the cases, respectively. The WD was not limited in 37.5% and lower than 100 m in 44.6 of the patients. Patients of group 1 experienced a statistically more prolonged pain (p<0.0001) and more intense compared to group 2 (p=0.02). Percentage of patients in which the VAS pain was higher than 50 mm was statistically higher in elderly patients (66.1% versus 46.4%; p=0.036). Additionally, patients over 65 experienced a more frequent pain which manifested during inactivity (p=0.001) and widespread (p=0.004) with significantly more altered WD (p=0.000). The two groups were similar for the rest of the clinical characteristics (Table 2).

Table 2. Clinical characteristics of both groups

	Group1 (n=56)	**Group 2 (n=56)**	**p**
Knee pain evolution term (years) average (SD)	8.4±9.2	3.2±3.6	**<0.0001**
VAS pain (mm) average (SD)	65.2±18	58.29 ±12	**0.02**
Mechanical timing (%)	94.6	98.2	0.309
Chronic character (%)	82.1	87.3	0.453
Bilateral character (%)	86.6	89.3	0.28
Pain at rest (%)	48.2	19.6	**0.001**
Pain at activity (%)	100	100	
Seat of knee pain (%)			**0.004**
Anterior	55.4	83.9	
Posterior	7.1	1.8	
Diffused	37.5	14.3	
Inferior irradiation (%)	10.7	1.8	**0.088**
Walking distance (%)			
Not limited	37.5	78.6	**<0.0001**
500<WD<1000 m	0	1.8	**-**
200<WD<500 m	14.3	12.5	**-**
100<WD<200 m	3.6	0	**-**
<100 m	44.6	7.1	**<0.0001**
Flinch (%)	39.3	42.9	0.701
Blocking (%)	16.1	16.1	1
Creak (%)	17.9	19.6	0.809
Axial deviation (%)	60,7	17.9	**<0.0001**
Knee flexion	39.3	5/56	
Varus	17.9	2/56	
Valgus	3.8	3/56	
Lameness (%)	30.3	14.3	**0.041**
Patellar Shock (%)	23.2	19.6	0.645
Signs of knee plane (%)	100	100	**-**
Limitation (%)	48%	21.4	**0.005**

VAS: visual analogic scale – SD: standard deviation – WD: walking distance - N: number. mm: millimeter. m: meter

Physical examination was pathological in all cases. The most frequent anomalies was knee cracking (100%) followed by axial deviation (60.7% flexion deformity in 22 patients) which was bilateral in 51.8% and knee mobility limitation (48.2%) essentially when stretching. Statistical analysis showed, in group 1, statistically more frequent anomalies regarding patients of less than 65 years of age in terms of percentage of axial deviation (p=0.0001), of limping (p=0.041) and limitation of knee mobility (p=0.005).

3.3 Functional Consequences of Knee Osteoarthritis in the Elderly

The Lequesne functional score, on average, was 11.02±4.8 [3-18], which was statistically higher in younger patients (0.001). In addition, percentage of patients with a functional score higher or equal to 10, complaining of a great discomfort, was statistically higher in group 1 (60.7% versus 37.5%) (p=0.014). Distribution of patients according to Lequesne functional score, as well as the comparative study are to be found in Table 3.

3.4 Radiographic Characteristics of Knee Osteoarthritis in the Elderly

Radiographic knee osteoarthritis was bilateral in all cases. Half of the patients of group 1 had stage 4, according to Kellgren and Lawrence radiographic classification (Table 4). Radiographic risk was deemed significantly more severe in group 1 compared to group 2 (p=0.02).

4. DISCUSSION

Comparison between subjects aged over 65 and those aged less than 65 showed that there was no difference regarding gender, origin and anthropometric characteristics except for the WC. Gonalgia had longer evolution duration, was more intense, frequently more widespread and was felt more frequently during inactivity in the elderly. Axial anomalies and rigidity during examination were more frequently observed in group 1. Functional discomfort was more important in subjects aged over 65. Radiographically, the damage was more advanced in the elderly.

Our workforce is important due to the fact that the study was made in a third line university hospital that employed a large number of people. Thus, the sample is representative of the general population, which allowed us to make solid statistical analyses. Also, note the importance of the subject. As far as we know, very few comparative studies of knee osteoarthritis of the elderly have been published. However, our work has its limits which are apparent mainly due to the absence of evaluation of the profile of knee osteoarthritis under treatment.

In the general population, the highest prevalence of knee osteoarthritis is observed in subjects aged 60 and over [3,11]. The results of a recent meta-analysis including 85 studies showed that old age was a risk factor of being plagued by knee osteoarthritis and that the effect of age on gonalgia was linear [12]. Moreover, it is the fact that women are more prone to developing knee osteoarthritis [12]. In fact, knee osteoarthritis is more frequent in women than in men, once they have turned fifty, then this gap widens with age [3,13]. Our results are an affirmation of the data in the literature.

Additionally, obesity constitutes an important risk factor of developing and progression of knee osteoarthritis [12,14,15]. BMI was negatively linked to the thickness of the joint cartilage and positively linked to the deterioration of knee

Table 3. Comparative study of functional discomfort

	Group 1 (n=56)	Group 2 (n=56)	p
Functional score average (SD)	11.02 ± 4.8	8.21 ± 3.9	0.001
Functional discomfort (%)			0.78
None: 0 points	0	0	
Minimal discomfort : 1-4 points	7.1	21.4	
Medium discomfort: 5-7 points	21.4	26.8	
Important discomfort: 8-10 points	26.8	23.2	
Very important discomfort : 11-13 points	12.5	14.3	
Unbearable discomfort: ≥ 14 points	32.1	14.3	

N: number of patients

Table 4. Comparative study of radiographic stages

Kellgren and lawrence	Group 1		Group 2	
	N	%	N	%
Stade 1	0		0	
Stade 2	8	14.3	19	33.9
Stade 3	20	35.7	21	37.5
Stade 4	28	50	16	28.6

N : number of patients

cartilage [16-18]. Today, we tend to integrate obesity-linked osteoarthritis in a larger phenotype of osteoarthritis associated to the metabolic syndrome (or metabolic osteoarthritis) because it was proved that there was a connection between osteaoarthritis and metabolic syndrome [19]. Metabolic syndrome is also considered a risk factor independently of knee osteoarthritis [20,21]. Excess of mechanical constraints due to overweight and applied to the knee, weight-bearing joint, activates mechanoreceptors that are present on the surface of the chondrocytes and of the cells of the subchondral bone (osteoblats, osteocyts, osteoclasts). That will trigger various pro-inflammatory and pro-degradative intercellular signaling pathways. The adipokines, cytokines, mainly produced by the adipose tissue, may play an important role in this relationship. Some of them, like the leptin, the adiponectin and the visfatin are also produced by the joint tissues (cartilage and/or subchondral bone and/or the synovial membrane). Additionally, a high leptin plasma level is associated with thinner knee cartilage and with a more important loss of the cartilaginous volume, as time goes by regardless of the W [22]. A recent hypothesis claims that the effect of abdominal obesity in knee osteoarthritis is so important that it becomes part of the concept of metabolic syndrome. Many parties confirmed the significant association between abdominal obesity and knee osteoarthritis regardless of total obesity [23,24]. In our study, more than three quarters of the patients were at least overweight which was similar to younger patients. 80% of the patients over 65 years of age had an abdominal obesity. However, the mean value of WC was less important in the elderly.

Moreover, with the elderly, the buildup of other metabolic anomalies such as arterial hypertension, dyslipidemia or diabetes increase the risk of having knee osteoarthritis [25]. Some epidemiological studies had revealed a significant association between osteoarthritis and several elements of the metabolic syndrome, regardless of obesity or other known risk factors of osteoarthritis [20,21]. Thus, hypercho-lesterolemia, hypertriglyceridemia, diabetes and arterial hypertension were associated to a significant increase of the risk of knee osteoarthritis [12,26]. We also have to take into consideration the effect of potentiation of abdominal obesity which is associated to an increase of the incidence of comorbidity through chronic inflammation [26]. In our study, the rate of comorbidities, associating with arterial hypertension, dylpidemia and diabetes was significantly higher in group 1.

Moreover, in obese subjects of the same BMI, the presence of sarcopenia is associated to a growing of knee osteoarthritis incidence [27]. In this regard, sarcopenic obesity is a problem of public health found in elderly population. Aging is associated to an important sarcopenia [28-30]. Obesity apart, other anomalies have been incriminated in the hypothesis of the metabolic osteoarthritis to wit vitamin D deficit. Low rates of vitamin D were associated in a significant way to an increase of the risk knee osteoarthritis and to radiographic progression [31]. Deficiency of vitamin D is common in elderly due to compromised mobility, lack of exposure to the sun, bad response of week skin to ultraviolet rays and low intake of vitamin D. A national Korean study has proved that deficiency of vitamin D is associated to a change of the quality of life in the elderly suffering from knee osteoarthritis [32].

Pain is considered one of the best evaluation criteria of knee osteoarthritis, placed in the centre of Douglas diagram [33]. In our study, gonalgia was chronic in most of the cases often with mechanical pain. The same applies to younger patients. This coincides with the literature data [13,34,35]. In addition, in accordance with Kssibi and al [35], pain was more intense in elderly but with no significant difference in the control group. It has been proved that the axial misalignments were factors of progression of preexisting knee osteoarthritis [3,34]. The emergence of flexion deformity is frequent during knee osteoarthritis and constitutes a aggravating factor [36]. Axial

deviations were registered in 60.7% of the cases and in most cases it was flexion deformity. Those axial deviations were statistically more frequent than in younger patients. That was not known in the series of Kssibi et al. [35]. On the other hand, in accordance with the literature data, joint mobility limitation was more frequent in the elderly [35].

In our work, evaluation of the functional consequences was significantly more important in the elderly than in the younger patients. This may be due to the intensity of pain, to the bilateral damage of both knees and the evolution of the disease which progressively entails functional limitation and the WD [37]. This was not noted in the work of Kssibi et al. [35], since no important difference was found with the scale of functional discomfort between the elderly and the control group. In this study, the values of Lequesne index were lower than those in our series. It has been proved in multicentric studies that knee osteoarthritis, whether radiological or symptomatic, is a risk factor of fragility and decrease of physical performance in the elderly [38-40]. Two mechanisms were identified which can explain the relation between knee osteoarthritis and this fragility. It is pain that is generated by the disease and the weakness of the quadriceps compounded by immobility [41]. Mairet and al had shown that decrease of the quadriceps strength in the elderly with unilateral knee osteoarthritis is an indication of a decrease of neuromuscular efficiency and muscle mass [42]. We have not studied the strength of the quadriceps in our study.

Therapeutic orientations of knee osteoarthritis are numerous. A practical guide explaining how to monitor pain knee osteoarthritis in geriatrics has been recently published [43]. Treatments that are likely to cause less systemic toxicity must be favored, with a frequent reevaluation of tolerance of side effects. Therapeutic education, loss of weight and physical exercise are the main ingredients for the treatment of knee osteoarthritis in elderly. Particular focus should be put on the limitations of the BMI when evaluating the body fat mass in the elderly due to the frequent loss of lean body mass in this population.

Rehabilitative treatments have proved efficient in reducing pain, improving functions and the quality of life of elderly who is afflicted with knee osteoarthritis [44]. Moreover, Sbabti and al had underlined the importance of rehabilitation when treating the elderly with knee osteoarthritis as opposed to younger subjects through a case control-study [45]. Decreasing pain and improving functional capacity were significantly more obvious in the elderly.

5. CONCLUSION

This study shows that knee osteoarthritis is more severe in the elderly patients in its various and anatomical aspects as well as its impact on normal functions. If specific therapeutic recommendations must target the elderly in particular, they must take into consideration patients who are suffering multiple comorbidities. According, two problems must be avoided: Not to identify, within crippling multi-pathologies, the site of osteoarthritis that can benefit from a specific therapeutic treatment or, conversely, blame on articular degenerative disease a pathology of a different origin which can, otherwise, be treated efficiently.

ETHICAL APPROVAL

The study has been approved by the local ethnic committee of the hospital and all participants gave their informed consent.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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